STUDY MODULE DESCRIPTION FORM

Name of the module/subject **(-)**		Code **1010314381010316981**
Field of study **Power Engineering**	Profile of study (general academic, practical) **(brak)**	Year /Semester **4 / 8**
Elective path/specialty **Electrical Power Engineering**	Subject offered in: **polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **18** Classes: **-** Laboratory: **-** Project/seminars: **9**		No. of credits **5**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**	
Education areas and fields of science and art **technical sciences**		ECTS distribution (number and %) **5 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of electricity, power systems, telecommunications and information technology, transmission and distribution of electricity, power markets and electric power management, the information technology in power systems and security of power supply.
2	**Skills**	The ability to assess the costs and benefits from the implementation of the analysed processes by their participants. Ability of effective self-education in the chosen field of study.
3	**Social competencies**	Is aware of the need to broaden his competences, presents willingness to work together within a team, aspires to improve the efficiency of process performance.

Assumptions and objectives of the course:

Presentation of the impact of price elasticity of demand on the formation of the load curve shape of power grids and on electricity prices. Presentation of the role of demand-side as one of elements needed for the sustainable development of energy systems and of the benefits gained by demand side management. Learning of tools for the effective development of the demand curve shape. Demand side control assessment as an effective element for the development of effective market relations. Learning of modern technologies of energy flows management in power networks. Learning basics of designing effective demand side management / demand response programs.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Student is able to describe the new directions in the development of effective and safe management of the power flows in distribution networks and development of market relations in this area. - [K_W18++]

2. Student is able to apply the principles and tools of demand side management making profit of the price elasticity of demand for optimal electricity delivery to customers. - [K_W22++]

Skills:

1. Student can propose actions to change the energy usage pattern in order to achieve the technical and economic benefits. - [K_U10++]

2. Student can evaluate and investigate modification of approach in the power distribution and energy consumption patterns to improve efficiency basing on market conditions designed in accordance with European Union energy strategy. - [K_U19++]

Social competencies:

1. Student is able to think and act in an entrepreneurial manner, taking into account the tasks performed by all participants in the process of power delivery to consumers. - [K_K02 +++]

Assessment methods of study outcomes

Lectures:

- evaluation of the knowledge and skills demonstrated in written tests concerning issues discussed,

Classes of design:

- test of knowledge necessary for the effective and efficient accomplishment of the elements of the design tasks executed individually.

Course description

The potential of the demand side management in the national power system. The importance of the demand side management for the operation of the electricity market in Poland and Europe. Demand side management and demand response as part of the management of the power flow in the network and to improve energy efficiency and network assets utilisation. Types of demand-side programs and benefits they can achieve. Building demand side management programs. Tariffs as a tool for demand side management. Energy market analysis tools for demand side management programs design. The improvement of efficiency of demand-side programs implementation as a result of the installation of smart meters. Demand side management as part of the smart grid, improving the security of power supply of electricity as well as the reliability and quality of power supply. Demand management using distributed and centralized energy storage. Plans of demand side management application in Poland. Basic design index of demand side programs applied for the evaluation of their efficiency.

Basic bibliography:

1. Smart metering. Inteligentny system pomiarowy. Krzysztof Billewicz. Wydawnictwo Naukowe PWN, Warszawa 2012

2. Opracowanie modelu stosowania mechanizmów DSR na rynku energii w Polsce. Polskie Sieci Elektroenergetyczne Operator S.A. CATA, 2010, www.piio.pl

3. Sterowanie popytem na energię elektryczną w sytuacjach niedoboru mocy : przegląd metod. Dariusz Bober, Politechnika Lubelska, Prace Instytutu Elektrotechniki, zeszyt 238, 2008.

Additional bibliography:

1. Jednolity rynek energii elektrycznej w Unii Europejskiej w kontekście bezpieczeństwa energetycznego Polski. Agnieszka Pach-Gurgul, Difin 2012, ISBN: 978-83-7641-717-2

2. Zbudowanie i uzgodnienie modelu rynku opomiarowania i stosowania mechanizmów zarządzania popytem wraz z opracowaniem modeli biznesowych. Opracowanie Hewlett-Packard Polska Sp. z o.o. 2009, www.piio.pl

3. National Action Plan on Demand Response. The Federal Energy Regulatory Commission Staff USA 2010, Docket No. AD09-10, www.ferc.gov

Result of average student's workload

Activity	Time (working hours)
1. participation in lectures	18
2. preparation for the exam	21
3. participating in consultations on the lecture	3
4. participation in classes of design	9
5. participating in consultations on the design	2
6. individual execution of elements of the design	9

Student's workload

Source of workload	hours	ECTS
Total workload	62	5
Contact hours	32	2
Practical activities	20	1